

Bridging the gap between complex data and decision makers: an example of innovative interactive tool

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Overview

Timing **Assembling** **Layering** **Views** **Animation**

Context

Some examples

The MIL – interactive XLS

Relevance

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Context, in the transportation field

- ↑ data gathering, processing and modelling tools
- ↑ free and generic tools → microdata and spatio-temporal analysis → GIS
- Automatic data acquisition systems (GPS or smart card for instance) → more data available + increased expectations + more complex models
- Harder to collect classical data (surveys) → even more important to illustrate the relevance of outputted data
- visualization = potential in all stages of the data gathering and transportation planning processes

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The MacEachren's "Cube" → visualization

FROM:
visualization as a **PRIVATE** tool for the exploration of **UNKNOWNs** phenomena and relations using **HIGH** level of interaction

TO:
visualization as a **PUBLIC** communication tool for the dissemination of **KNOWN** facts using **LOW** level of interaction

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The Greater Montreal Area context

- Large-scale travel surveys since 1970 app. every 5 years → 5% sample (70 000 households in 2003)
- Data dissemination tools = part of the usual data production process for some time
- Tools developed more than 10 years ago are now used by the Ministry of Transportation for the dissemination of key facts in all the main area of the Quebec Province
- Features: interactive spreadsheets (Ms Excel)

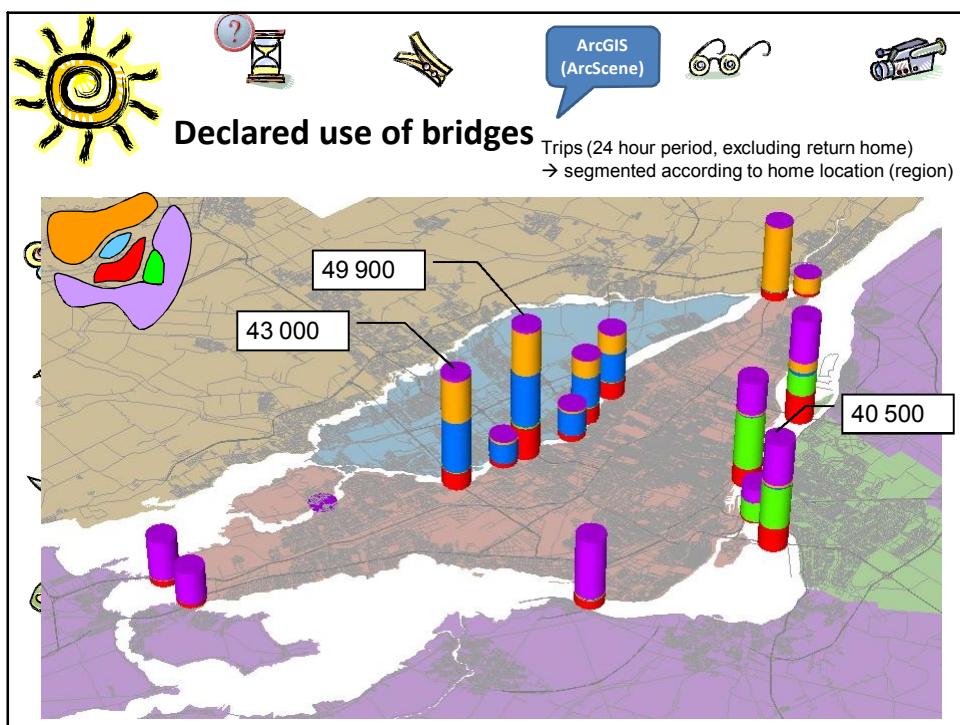
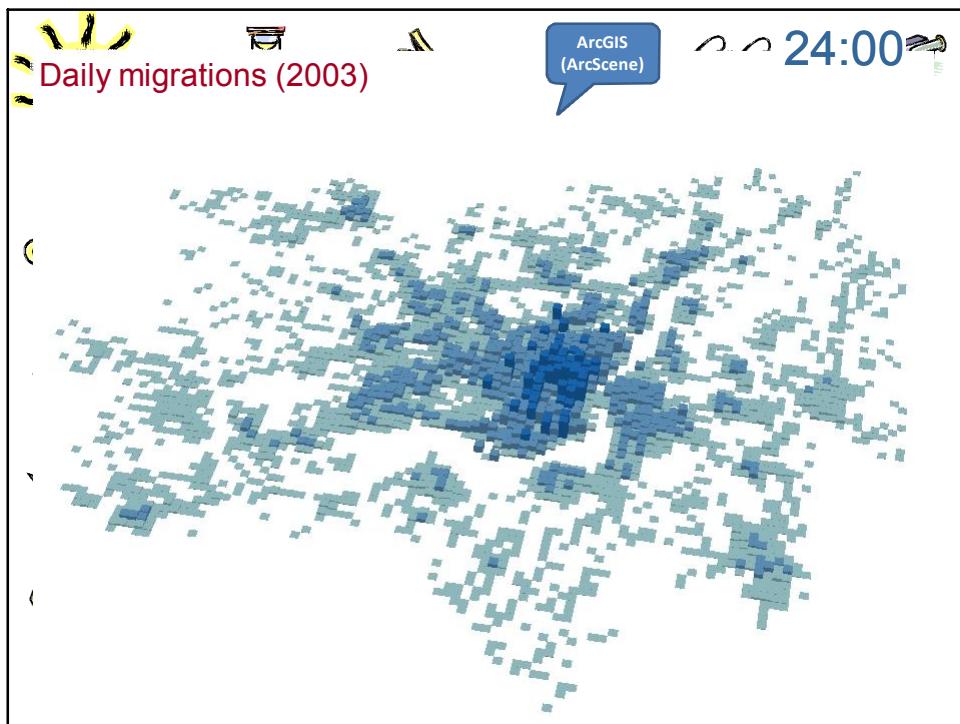
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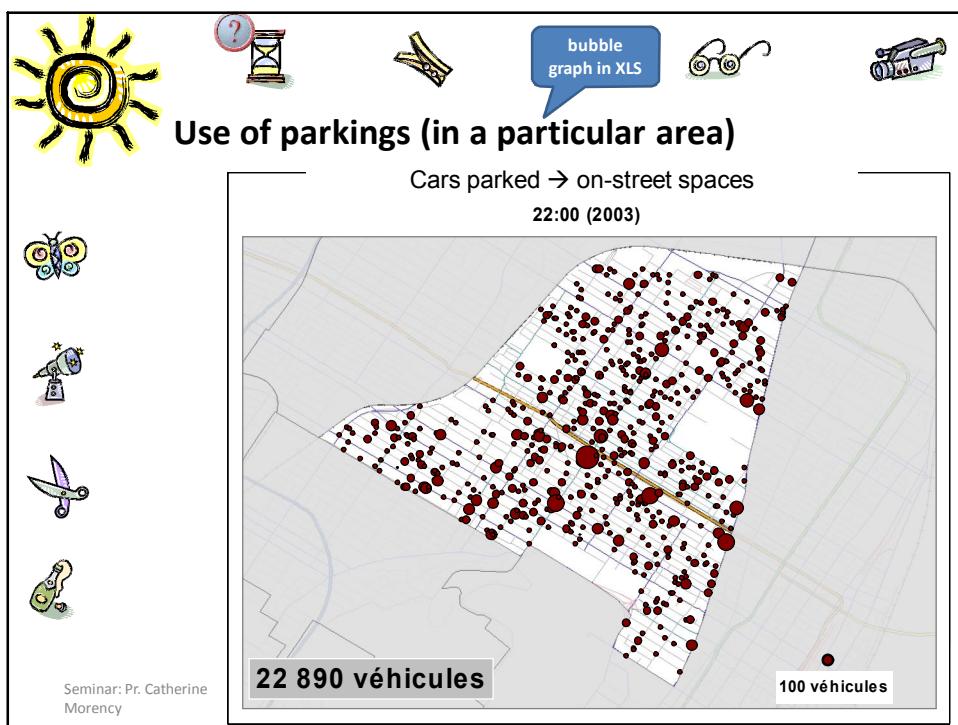
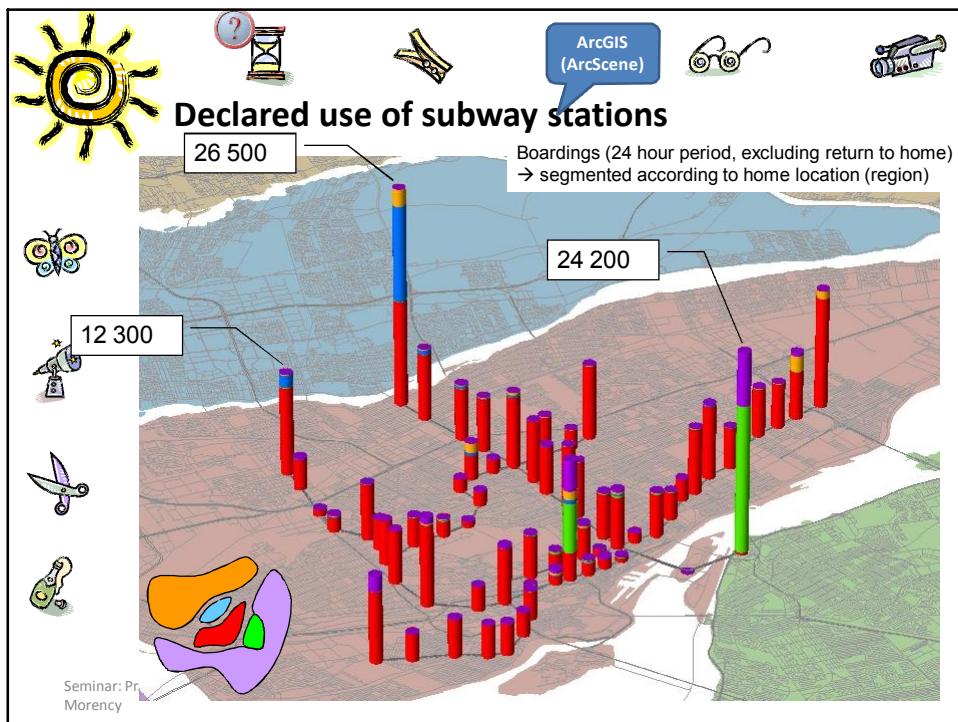
Some visualization examples

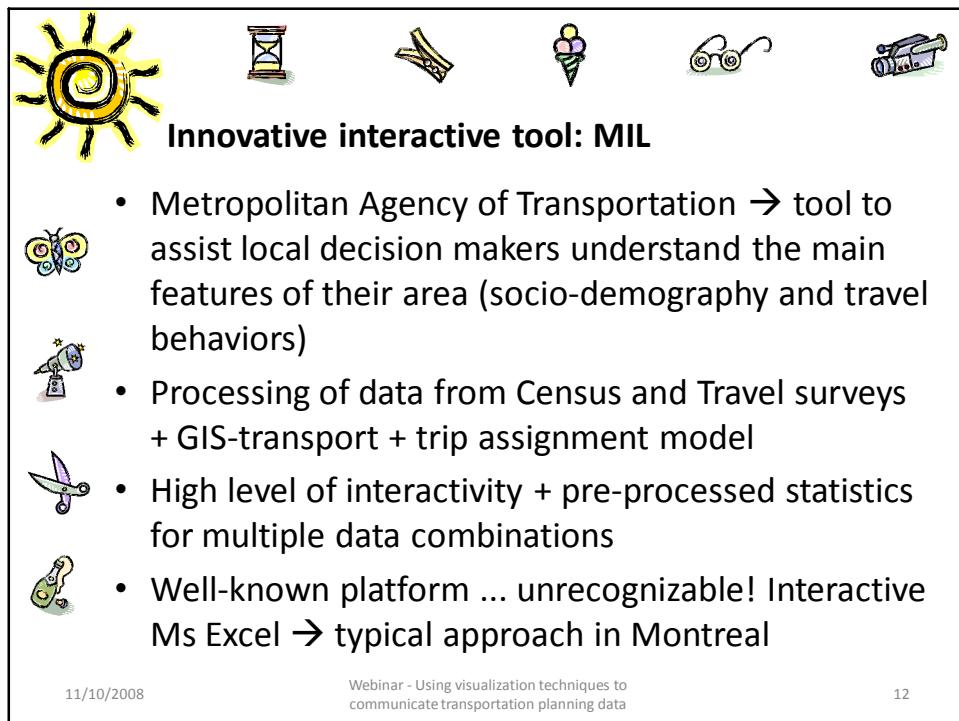
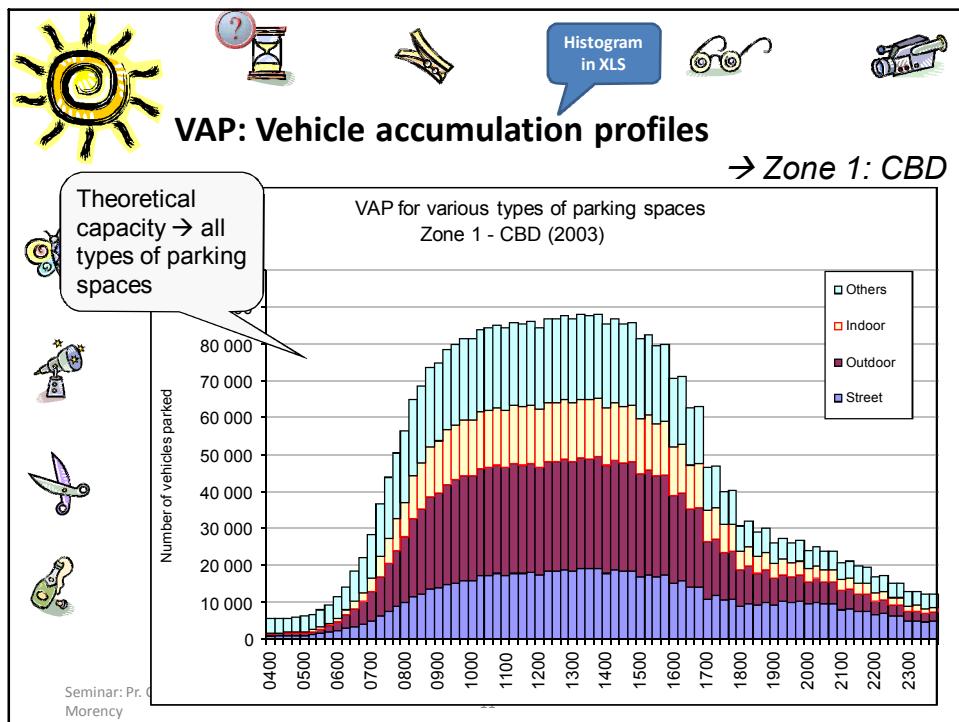
→ used for public/technical dissemination of key facts from OD surveys

1. 24-hour monitoring of migrations → importance of CBD in the daily activities
2. Who uses the bridges and subway stations → political + fiscal issues
3. Who uses the parking spaces available in critical areas → demand management
4. the MIL (Municipal Interactive Leaflets) for data dissemination towards technicians and decision makers

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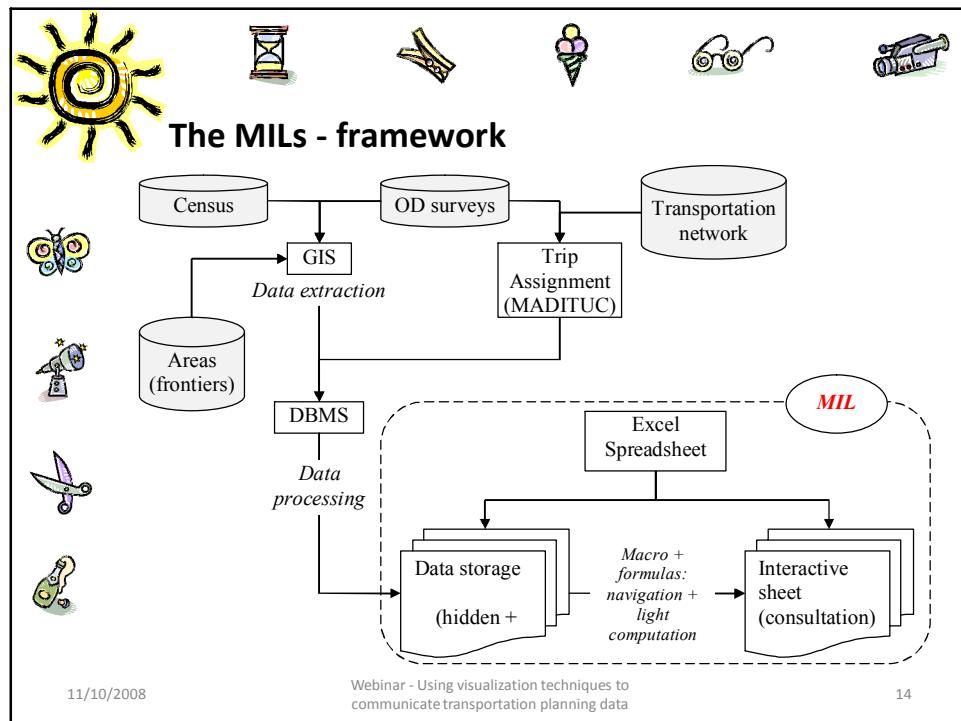
Innovative use of XLS → Many examples in GMA

Subway incidents

Car Accumulation Profile

Heavy trends + spatial dispersion

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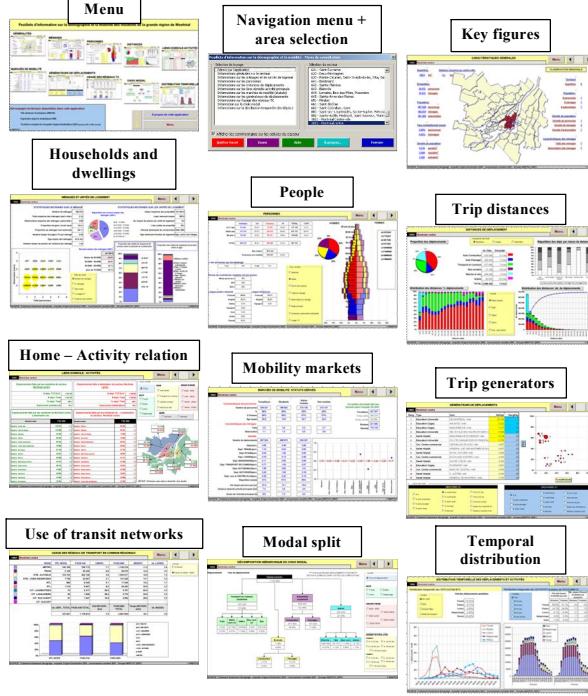


The MILs

Data + processes + visualization tools

1 menu sheet + navigation window + 10 interactive interfaces including: shapes, push buttons, database functions, charts, filtering tools, ...



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Some MIL'S screens

- Key figures
- People
- Trip distances
- Trip generators
- Modal split
- Temporal distribution

Statistics available for various areas:
 100 analysis areas
 8 large regions
 Municipalities

Multiple variable combinations in each screen
 All values are pre-compiled

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MIL: Key figures

Key features

Area under study

Area selector

Rank of the area within the GMA

Clickable map for area selection

CARACTÉRISTIQUES GÉNÉRALES

1002 Montréal centre

Superficie: 155,6 km²

Distance moyenne au centre-ville: 4,1 km

Échantillon:

- 32 672 personnes
- 15 473 ménages

Population:

- 967 526 personnes
- 462 574 ménages
- 361 062 automobiles

Taux échantillon moyen

- 3,38% (personnes)
- 3,42% (ménages)

Densité de population

- 6 216 personnes/km²
- 2 908 ménages/km²
- 2 320 automobiles/km²

SOURCE: Traitement totalement désagrégé - enquête Origine-Destination 2003 - recensement canadien 2001 - Groupe MADTUC © MANTIC 2003
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CLASSIFICATION RÉGIONALE

Territoire: Superficie: 6

Population:

- # personnes: 1
- # ménages: 1
- # automobiles: 1

Densité de population

- Densité de personnes: 1
- Densité de ménages: 2
- Densité d'automobiles: 1

Caractéristiques des ménages

- Taille des ménages: 2
- Motorisation des ménages: 2

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MIL: People

Descriptive statistics on people

Demographic chart with segmentation variable

Selection button for the segmentation of the demographic chart

PERSONNES

Montréal centre

	HOMMES	SE	FEMMES	SE	TOTAL	SE
0-17 ans	31 162	55,5%	29 475	46,8%	121 139	52,7%
18-49 ans	37 913	67,2%	32 214	56,0%	147 137	66,9%
50 ans et plus	51 255	82,3%	59 781	98,0%	149 036	55,4%
TOTAL	100 330	65,1%	90 460	55,6%	190 790	

Age moyen: 39,9 ans

Population totale: 22,8%

% des personnes ayant un diplôme:

- 1 ans: 18%
- 3 ans: 33%

Niveau de scolarité des résidents (15 ans et plus):

- Non qualifiés: 5%
- DIF: 1%
- BAC: 26%

Langues parlées à domicile:

- Français: 64,8%
- Anglais: 16,7%
- Turc: 1,7%
- Espagnol: 1,4%
- Grec: 1,1%
- Azerbaïdjanais: 0,9%
- Chinois: 0,2%

Langue d'entrevue:

- Français: 73,7%
- Anglais: 19,2%
- Espagnol: 1,2%

Ouv variable:

- Générale
- Statut
- Nombre d'habitants
- Taille du ménage
- Motorisation du ménage
- Ville principale
- Possession automobile individuelle

SOURCE: Traitement totalement désagrégé - enquête Origine-Destination 2003 - recensement canadien 2001 - Groupe MADTUC © MANTIC 2003
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MIL: Trip distances

Selection button for spatial perspective: home location, origin or destination

DISTANCES DE DÉPLACEMENT

Proportion des déplacements

Mode	Proportion (%)
Auto Conduite	29%
Auto Passager	26%
Transports en commun	23%
Rue scolaire	8%
Marche et vélo	3%
Autres	2%
TOTAL	100% (7.0 km)

Répartition des dépl. par classe de distance

Distribution des distances: nb. de déplacements

% of trips

Number of trips

Selection button for the two histograms presenting travel distance distributions

SOURCE: Traitement statistiquement séquentiel - enquête Saguenay 2001

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MIL: Trip generators

List of up to 15 main trip generators in the area

GÉNÉRATEURS DE DÉPLACEMENTS

Rang	Type	Nom	Nombre	Rang Rég.
1	Education Université	DE MONTREAL ~rd~	25 740	1
2	Education Collège	ANHUTICIC ~rd~	9 282	11
3	Education Collège	MAISON DE L'INTELLIGENCE ~rd~	7 271	15
4	Education Université	HEC ÉCOLE DES HAUTES ÉTUDES EN COMMERCE ~rd~	2 036	21
5	Santé - Hôpital	MAISON DE LA ROSEMONT ~rd~	5 219	35
6	Education Université	POLYTECHNIQUE MONTRÉAL PRINCIPIAL ~rd~	5 178	31
7	Cov. Centre commercial	VERGALLES PLACE ~rd~	4 057	33
8	Santé - Hôpital	ROYAL VICTORIA ~rd~	4 057	33
9	Cov. Centre commercial	ROCKLAND (CENTRE) ~rd~	4 330	33
10	Santé - Hôpital	SAINTE-COURE ~rd~	4 333	40
11	Education Collège	ROSEMONT ~rd~	3 991	42
12	Cov. Centre commercial	MARCHÉ CENTRAL ~rd~	3 054	43
13	Santé - Hôpital	S. JUSTINE ~rd~	5 934	45
14	Santé - Hôpital	GENERAL DE MONTREAL ~rd~	3 723	40

Interactive bubble chart presenting trip generators according to selected variables

Variables for abscise

Variables for ordinate

SOURCE: Traitement statistiquement séquentiel - enquête Saguenay 2001

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MIL: Modal split

DECOMPOSITION HIERARCHIQUE DU CHOIX MODAL

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Déplacements → Transports en commun → Automobile seulement → Autres

Variables: Tout les déplacements, travail, études, loisirs, magasinage

GROUPE CHIPIRE: 0600-0709, 0900-1009, 1200-1309, 1800-2009, 2100-2209

SEGMENT DE POPULATION: Homme: 0-5-15 ans, 16-25 ans, 26-35 ans, 36-45 ans, 46-55 ans et plus; Femme: 0-5-15 ans, 16-25 ans, 26-35 ans, 36-45 ans, 46-55 ans et plus

SOURCE: Tramways (équipement autorisé) - Infrastructures Québec-Québec (2003) - Recensement canadien 2001 - Groupe MIL (2001)

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MIL: Temporal distribution

DISTRIBUTION TEMPORELLE DES DÉPLACEMENTS ET ACTIVITÉS

1002 Montréal centre

Variables: Travail, Étude, Groupe d'âge, Mode de transport

ENTREES DES DÉPLACEMENTS

Variable	Travail	Étude	Groupe d'âge	Mode de transport
Trajet	18,1 %			
Études	9,7 %			
Loisirs	0,66 %			
Retour	0,42 %			
Magasinage				24,4 %

DISTRIBUTION TEMPORELLE DES ACTIVITÉS

Activité (Nombre de personnes)	Part des heures d'activité par jour	Nb moyen d'heures d'activité par personne
Travail	65,6 %	51,3 %
Études	24,7 %	26,8 %
Loisirs	8,1 %	16,4 %
Magasinage	3,6 %	6,3 %
Autre	7,2 %	6,3 %

TRIPS

PEOPLE

SOURCE: Tramways (équipement autorisé) - Infrastructures Québec-Québec (2003) - Recensement canadien 2001 - Groupe MIL (2001)

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Potential contributions of MIL screens

Type of studies	MIL screen								
	HH & dwel.	People	Trip dist.	Home act.	Mobil. markets	Trip gen.	Use of transit	Modal split	Temp. dist.
Network operations			+				++	+	++
Network planning				++					
Demand modeling	++	++			++	+			
Financing					++		+++		
Marketing, customer relationship	+	++		++	++	+			
Road & transit interfaces (ex. commuter train)			++				+	++	

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XLS +++: How is it relevant in the transportation Community?

	Teaching	Exploration	Dissemination
	<ul style="list-style-type: none"> • “Sense” of the data • Experiment multiple approaches + models • Interactive + adaptative • Easy programming + management 	<ul style="list-style-type: none"> • First step toward more complex models • Interactive + adaptative • Data processing abilities (filtering, Pivot tables, graph, GIS, ...) 	<ul style="list-style-type: none"> • Well-known interface + basic functions • Pre-structured visualization with some interaction (prevent from doing “wrong analysis”) • Access to more complex analysis → democratization of data

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MIL – innovative use of XLS!



- Readily available platform + pre-structured data = Facilitate dissemination towards decision makers → increase awareness with respect to transportation problems → add value to survey data → increase potential benefiters of data → facilitate data acquisition processes (financing, support, data access)

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Acknowledgments and reference



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- Morency, C., Trépanier, M., Piché, D., Chapleau, R. (2008). *Bridging the gap between complex data and decision makers: an example of innovative interactive tool*, to be presented at the 55th Annual North American Meetings of the Regional Science Association International, (November 2008, New-York)
- Chapleau, R., Morency, C., Bourgeois, M. (2008). *Simple and Interactive Spatial Mobility Analysis Tool for Data Visualization*, International Conference on Survey Methods in Transport: Harmonization and data comparability, Annecy, France.
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